

[product ID information provided as a two-dimensional barcode pattern for information management at an outer surface of said resin;]

a read device that reads [said] product ID information, said product ID information is provided as a two-dimensional barcode pattern for information management at an outer surface of said resin, said two-dimensional barcode pattern is comprised of a plurality of blocks arranged in a predetermined two-dimensional region; and

a management unit that registers said product ID information thus read and manages a product shipping process based upon said product ID information thus registered.

Please add the following new claim:

--21. A semiconductor device according to claim 1, wherein said two-dimensional barcode pattern is as formed on said semiconductor chip by photolithography.--

REMARKS

The Office Action of March 21, 2000 and the references cited therein have been carefully considered.

In this Amendment the claims have been amended to even more clearly and particularly define the invention. More specifically, each of independent claims 1, 4, 7, 11, 14 and 16 has been amended to more specifically define the two-dimensional barcode pattern utilized in the arrangement according to the invention. Additionally, a new claim 21 dependent on claim 1 has been added to positively recite an additional feature of the present invention.

Reconsideration of the rejection of claims 1-20, i.e., all of the previous pending claims, under 35 U.S.C. § 103(a) as being unpatentable over the reference to Merlin et al. in view of the patent to Shamir is respectfully requested. In urging this ground of rejection, the Examiner has

again, as in the prior Office Action, essentially taken the position that the Merlin et al. reference teaches all the limitations of the independent claims other than the use of a two-dimensional barcode pattern for storing the information. However, the Examiner has now combined the Merlin et al. reference with the Shamir reference which teaches the use of micro barcode indicia disposed on a semiconductor wafer or device to provide chip or wafer information, and has then taken the position that in view of the teachings of the Shamir patent, would be obvious to provide the Merlin et al. device with a micro barcode, and that to form this micro barcode as a two-dimensional barcode, as well as to provide the other limitations not taught by Merlin et al., would be mere matters of choice and design obvious to one skilled in the art. The positions taken by the Examiner are respectfully traversed.

Initially, it is pointed out that the Merlin et al. reference and its relationship to the various independent claims, even without the specific definition of the two-dimensional barcode now contained in each of the independent claims, was extensively discussed in the Remarks found in the response filed February 18, 2000 in response to the last Office Action. Those remarks with regard to the Merlin et al. patent are still believed to be pertinent here and, are incorporated by reference rather than repeating same here in their entirety. In general, it is again submitted that the Merlin et al. reference, not only does not utilize a two-dimensional barcode or any barcode, but moreover does not contain any of the limitations of the independent claims 1, 4, 7, 11, 14 and 16. It is submitted that, in fact, the present invention and the Merlin et al. are only similar in that both deal with providing information regarding a semiconductor device on or adjacent a semiconductor chip or device. It is again pointed out that the Merlin et al. reference specifically teaches that the indicia providing identification information with regard to a particular chip, for

example, the chip 16, are not provided on the chip, as required, for example, by claim 1, but rather are etched into the contacts 12 for the chip 16 found on the opposite surface of the substrate 15 on which the chip 16 is mounted.

Turning now to the additional differences between the present invention and the cited references, each of the independent claims 1, 4, 7, 11, 14 and 16 has been amended to more specifically define the two-dimensional barcode pattern representing identification information disposed either on the surface of a semiconductor chip, on a lead frame, or on the surface of the resin sealing a semiconductor chip. The thus positioned two-dimensional barcode pattern is constituted by a plurality of blocks disposed within a predetermined two-dimensional region on the specific object, i.e., semiconductor chip, lead frame or resin surface. Moreover, the various independent claims, and depending on the location of the two-dimensional barcode, specifically indicate that different type ID information is represented as will be discussed below.

Independent claims 1 and 11 specifically require that semiconductor chip ID information is provided on the surface of a semiconductor chip. As a result of this specific type information at a specific location, semiconductor chip information management can be realized with ease before processing of the chip takes place.

According to independent claims 4 and 14, information or the like related to a plurality of semiconductor chips mounted on a frame are provided on the frame as frame ID information, whereby information management for individual frames can be realized. As a result, the processing of individual semiconductor chips provided at each frame can be implemented with ease and reliability.

Finally, according to independent claim 7 and 17, product ID information, for example, information or like related to the semiconductor chip of a product, is provided on the surface of the semiconductor chip which is already been sealed by resin. Thus, information management with regard to already finished devices can be achieved. For example, when it is preferable to assign a single identifying number to semiconductor chips with slightly different specifications to facilitate management, the product ID information can be used as specific information for facilitating identification of the individual semiconductor sealed with resin even though they are assigned with the same product number.

Finally, as pointed above, all the independent claims and thus all of the claims, have been amended to more specifically define the two-dimensional barcode pattern. That is, as now required by each of the claims, the two-dimensional barcode pattern is constituted by a plurality of blocks set within a predetermined two-dimensional region on the surface of the specifically defined occasion, for example, the chip, lead frame, etc. The pattern is achieved through a specific arrangement of the plurality of blocks along the horizontal and the vertical directions, which pattern can be made to correspond to any information. As a result, a large volume of information can be provided in a very small area compared to the volume of information that can be provided to a one-dimensional barcode pattern as used in the prior art. In particular, the use of a two-dimensional barcode patterns as disclosed in the invention is especially effective in semiconductor device production in which a great deal of information, such as information with respect to the production process and past information, must be handled and easy access to which is desirable.

It is submitted that none of the specified type of information at the specific locations as discussed above, nor the use of a two-dimensional barcode of the type now defined in the claims is taught, suggested or made obvious by any combination of the teachings of the Merlin et al. and Shamir references.

The Merlin et al. reference, as indicated above discloses a structure for a connector or contactor 11 that includes an electronic chip 16 disposed on one surface of a support 15, and a plurality of metal contacts 12 divided by lines 13 on the opposite surface of the support 15. Identification marks 20, each constituted by several alphanumeric characters are provided on some of the metal contacts 12, for example, by etching. The structure is clearly illustrated in Figures 1 and 2 of the Merlin et al. reference.

As discussed above, while the marks 20 of Merlin et al. are provided on some of the metal contacts 12, there is no teaching, suggestion or anything that would render it obvious to provide marks 20 on the electronic chip 16 itself, as required, for example, in claims 1 and 11. Note that the placing of the marks 20 on the metal contacts 12 of Merlin et al. does not achieve any type of information management for the individual electronic chips 16 before the electronic chips 16 are mounted on the support 15, as is possible according to the present invention. Therefore, since the information with regard to the individual chips 16 of Merlin et al. is only available after the electronic chips are mounted on the support 15, the advantage achieved according to the invention as defined in claims 1 and 11 of the easy information management of individual chips is not present. Moreover, since the individual chips 16 of Merlin et al. have clearly already been separated from any lead frame, the advantages of the inventions defined in independent claims 4 and 14 of the present application, whereby easy information management

of individual frames can be realized by providing frame ID information at the frames, are likewise not achieved.

It is further pointed out that the Merlin et al. reference does not deal with electronic chips 16 being sealed with resin or the provision of any identifying indicia on an enclosure for the semiconductor chip. Rather, this reference is specifically directed to providing identifying data on the contacts for a chip mounted on a wafer support. Additionally, as recognized by the Examiner, the Merlin et al. reference solely concerns providing alphanumeric characters, which clearly requires a larger area to accommodate the characters, which then are capable of providing only a lesser volume of information.

In order to attempt to overcome the deficiencies of the Merlin et al. reference as discussed above and in the remarks in the prior Amendment, the Examiner has cited the Shamir patent which, in Figures 1 and 2 discloses a structure achieved by pasting a microlabel carrying indicia 46 in the form of a conventional barcode to a top surface 42 of an individual die 48. In Figure 8 of the Shamir reference, a structure wherein a microlabel 122 having a barcode formed thereon is pasted to a top surface of an encapsulation 126. Additionally, as illustrated in Figure 9a, barcode indicia 128 and alphanumeric indicia 130 can be provided on the same label. While the Shamir reference may overcome some of the deficiencies of the Merlin et al. reference, for example, it does teach that a barcode may be utilized to provide ID type of information on a chip or an encapsulate, it does not teach anything about the specific type of information located at the specific surfaces as recited in the claims. Moreover, while the Shamir reference does teach that the information provided may be in the form of a barcode, it clearly does not in any way teach, suggest or make obvious the use of a two-dimensional barcode, and in particular a two-

dimensional barcode as now defined in each of the independent claims, i.e. a two-dimensional barcode pattern constituted of a plurality of blocks set within a predetermined two-dimensional region. It is again pointed out that such a two-dimensional barcode, with the advantages resulting therefrom or high information content is not disclosed, taught, suggested or made obvious by either of the Merlin et al. or Shamir references. Thus, no combination of the teachings or suggestions of the two references could result in the structure and advantages provided according to the present invention.

Accordingly, for the above stated reasons, it is submitted that claims 1-20 are allowable over the combination of the Merlin et al. and Shamir patents under 35 U.S.C. § 103.

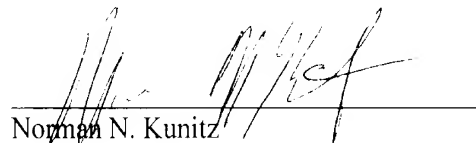
Newly presented claim 21 is dependent on claim 1, and specifically recites that the two-dimensional barcode pattern was placed or formed on the surface of the semiconductor chip by photolithography. As pointed out above, the Merlin et al. reference does not teach placing any type of information pattern on the surface of a semiconductor chip, but rather only teaches forming an information pattern in the contacts for a semiconductor chip. While the Shamir patent does teach placing a single barcode on the surface of a chip, it specifically teaches information of only a one-dimensional barcode, and the placement thereof by pasting a label on the surface of the semiconductor chip. The formation and then placing and pasting of coded labels on a chip surface is entirely different, both according to the process and in the resulting structural appearance, than a two-dimensional barcode pattern formed by photolithography as required by claim 21. Accordingly, it is submitted that claim 21 is allowable over the cited combinations of references for the above stated reason, in addition to those discussed above with regard to claim 1 from which claim 21 depends.

A check in payment of the additionally required claim fee of \$18.00 for one additional dependent claim is attached.

In view of the above amendments, and for the above stated reasons, it is submitted that all of the pending claims, i.e. 1-21, are allowable over the prior art of record and are in condition for allowance. Such action and the passing of the case to issue therefore are respectfully requested.

If the Examiner is of the opinion that the prosecution of this application would be advanced by a personal interview, the Examiner is invited to telephone undersigned counsel to arrange for such an interview.

Respectfully submitted,



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